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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,989	07/28/2003	Sudhir Gondhalekar	A7728/T48810	7726

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EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 05/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/630,989

Applicant(s)

GONDHALEKAR ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 13-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 13-20 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-12, drawn to apparatus, classified in class 156, subclass 345.33.
- II. Claims 13-20, drawn to method, classified in class 427, subclass 569.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus as claimed can be used for processing a non-semiconductor work-piece.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

During a telephone conversation with Chung-Pok Leung on 5/2/2005 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-12. Affirmation of this election must be made by applicant in replying to this

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Office action. Claims 13-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Drawings

The drawings are objected to because sheet 2 of drawing is labeled as "2/5" instead of "2/4". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

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the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1, 4, 5, 8, 9, 10, 12 are rejected under 35 U.S.C. 102 (b) as anticipated by Yoshida et al (Pub. No. 08-097188).

Regarding Claim 1 Yoshida et al teach an apparatus (Figure 1) for processing semiconductor substrates, the apparatus comprising:

a chamber defining a processing region therein (per paragraph 0008, not shown in the Figure 1);

a substrate support disposed in the chamber to support a semiconductor substrate 24 (shown in Figure 1, but not labeled);

at least one nozzle 11 extending into the chamber to introduce a process gas into the chamber through a nozzle opening; and

at least one heat shield 15, disposed around at least a portion of one of the at least one nozzle, the heat shield having an extension which projects distally of the nozzle opening of the nozzle and which includes a heat shield opening for the process gas to flow therethrough from the nozzle opening.

Regarding Claim 4,12: Per Figure 1, the heat shield 15 is shown as extending beyond tip of Nozzle 11.

Regarding Claim 5: Yoshida et al teach (per Figure 1) that the heat shield 15 is disposed around substantially the entire nozzle 11 extending inside the vacuum chamber which is not shown in the figure 1 (paragraph 0008).

Regarding Claim 8: Yoshida et al teach that the heat shield 15 comprises a hollow cylindrical (tubing) member (paragraph 0008).

Regarding Claim 9: Yoshida et al teach (paragraphs 0008 – 0012, and Figure1) about a heat shield 15 for shielding a nozzle 11 extending into a chamber to introduce a process gas into the chamber through a nozzle opening, wherein the chamber defines a processing region therein and has a substrate support to support a semiconductor substrate 24 for processing in the chamber, the heat shield comprising:

a hollow member 15 configured to be coupled with the nozzle 11 and having an internal dimension sufficiently large to be disposed around at least a portion of the nozzle, the hollow member 15 having an extension which projects distally of the nozzle opening of the nozzle and which includes a heat shield opening for the process gas to flow therethrough from the nozzle opening.

Regarding Claim 10: Yoshida et al teach (paragraph 0008, Figure 1) that the heat shield 15 of claim 9 is a hollow member and which is cylindrical, and has an internal cross-section which is slightly larger than an external cross-section of the nozzle 11.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2,3, 11 are rejected under 35 U.S.C. (a) as being unpatentable over Yoshida et al (Pub. No. 08-097188) in view of Tsukune (Document No. JP 09-134880).

Regarding Claims 2,11: Yoshida et al teach all the claim limitations except for the material of the heat shield. Tsukune teaches a CVD equipment (Figures 1-5) with a shutter 41 around a gas nozzle, for shielding the gate 13 from heater 15, resulting in improved film thickness distribution (paragraph 0021). Tsukune also teaches (paragraph 0022) that the body 43 of shutter can be made from ceramic (paragraph 0022).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize ceramic material for heat shield as taught by Tsukune in the apparatus of Yoshida to obtain improved film thickness distribution.

Regarding Claim 3: Yoshida et al teach all limitation of claim 3, except for the material of the heat shield. As explained above, Tsukune also teaches (paragraph 0022) that the

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body 43 of shutter can be made of Alumina (Aluminium Oxide), Silicon carbide, and a ceramic like metal nitride.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize any of the ceramic materials such as Aluminium Oxide, Silicon Carbide, Aluminium Nitride as material for the heat shield as taught by Tsukune in the apparatus of Yoshida to obtain improvement in film thickness distribution.

Claims 6, 7 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Yoshida et al (Pub. No. 08-097188) in view of Narwankar et al (US Patent No. 6,200,911 B1)

Regarding Claim 6, 7: Per Figure 1, Yoshida teach al limitations of claims 6, 7 except for plurality of nozzles. Narwankar et al teach plurality of gas nozzles that provide a uniform flow of gas over the substrate (column 6, lines 45-50), in a high density plasma CVD system.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of nozzles with heat shields in the apparatus of Yoshida et al to obtain a uniform flow of gas over the substrate.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Orsini et al (US Patent No. 6,657,213) teach a high temperature EUV source (Figure 2), having a target delivery tube 72, which provides thermal isolation to the target material from the heated nozzle body 48.

Takaoka et al (Pub No. 11-354062) teach a thermal shield plate 15 (Figure 1, Figure 3) through which the nozzle tips 22 can pass while correcting defects on a substrate in an ion beam processing device.

Donohoe et al (Pub No. 2004/0035531) teach a plasma process reactor for semiconductor processing with a greater control in functional temperature range by splitting the process gas flow into two streams where the first stream goes behind the gas distribution plate 128 and the second stream is injected directly into the process chamber 112 (Figure 2).

Yamagashi et al (Pub. No. 2004-107686) teach an Air Open Type CVD system (Figure 3) which has a radiation shield 10 to prevent overheating of nozzle 5 from the hot plate 15.

Orsini et al (US patent No. 6,835,944) teach a Low vapor pressure, low debris target for EUV production having a thermal shield 60 for the gas nozzle 56 to maintain the target in the cryogenic state.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh K Dhingra



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